2MASS-IRAS Newly Discovered Exozodiacal Vega-type Dust

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We obtained J (1.25 μm), H (1.65 μm), and K_s (2.17 μm) photometry from the 2-Micron All-Sky Survey (2MASS), and 12, 25, 60, and 100 μm photometry from the IRAS Faint Source Catalog (FSC), of a sample of 2928 field stars. We identified 308 main-sequence (luminosity class IV, IV–V, or V) stars from this sample. The luminosity classes were either previously known (165 stars), determined from their Hipparcos distances and spectral types or $J - K_s$ colors (107 stars), or estimated from their $J - K_s$, $H - K_s$ colors (36 stars). We searched this sample of main-sequence stars for excess 12 μm emission with respect to the J, H, and K_s photospheric emission. We discovered 8 systems with 12 μm excess emission newly reported here. The excesses in these systems are likely to be from Vega-type circumstellar dust. Simple models of the excess emission show that dust in these systems is in a zone where material is heated by the star to the temperature characteristic of "terrestrial material," $\sim$ 200–500 K, located at $\sim$ 1-10 AU from the stars. Colder dust might exist as well in the systems but below the IRAS sensitivity limit. The exception is HD 93331 (B9.5 V), previously known for its IRAS far-infrared excess, and newly reported here for its 12 μm excess. This system is likely to be spatially resolved with current imaging technology. The origin of the dust in the systems discussed here may be in the collisional debris of asteroidal collisions, seen in their immediate aftermath, or in a high steady state period of infalling material from more distant material in a Kuiper Belt. A fuller understanding of the distribution, origin, and evolution of this dust may require more sensitive observations at long wavelengths by SIRTF.

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